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Subject: Pest Evaluations of Scott River/Goosenest RD Campgrounds (FPM Rept. N99-6)
To: Forest Supervisor, Klamath National Forest

On August 4, 1999, Dave Schultz, Entomologist, and I met with Carl Varak to assess forest insect and disease conditions at Kangaroo Lake, Trail Creek and Carter Meadows Campgrounds on the Scott River Ranger District. The following day, Dave and I met on the Goosenest Ranger District with Deb Fleming, Roger Siemers, John Perkins and Rich Svilich to look at a variety of insect and disease situations. During that day, we assessed pest conditions at Juanita Lake Campground. The following report summarizes our observations and recommendations.

Kangaroo Lake Campground

Kangaroo Lake Campground is the most highly used campground on the Scott River Ranger District. The campground is within a mixed conifer forest at an elevation of approximately 6000 feet. The overstory is composed of mixed ages of white fir, red fir, western white pine, Jeffrey pine, lodgepole pine and incense-cedar. Most are mature to overmature, though natural regeneration is present in some areas. At first glance, it appears that the density of this overstory is low. However, because of the rocky conditions and limited soil, the overstory trees are growing in clumps of 5-8 trees each where the soil has aggregated in depressions in the underlying rock. Upon inspecting the growth rings of cut stumps and a sample of live trees, it became evident that growth of these trees has slowed considerably over the last 10 years. Many of the trees in the clumps are declining, showing flat tops and thinning crowns. Many have died and were removed as hazard trees. In a few areas, stocking levels are low.

Overall, the number of obvious hazard trees in the campground was low. A variety of common defects, including multiple tops, mechanical wounds, brooms, cracks and exposed roots were noted. Most of these defects, however, contribute only moderately to hazard potential.

Small amounts of dwarf mistletoe (*Arceuthobium monticola*) were noted in some of the western white pines in the campground. However, far more serious was the discovery of annosus root disease (caused by *Heterobasidion annosum*) fruiting bodies in two red fir stumps near campsite #4, in the upper section of the campground. Columns of laminated decay on cut stump surfaces, which are another reasonably good indicator of *H. annosum*, were also found in the area. The fir variety ("s-type") of annosus root disease causes a root and butt rot of true fir and hemlock. It does not infect pines or cedar. The disease has the potential of creating highly hazardous conditions in campground situations. While the fruiting bodies and decay columns of *H. annosum* were only found during our brief visit in one area of the campground, it is likely that the disease is more widespread.

Recommendations:

Hazard Tree Reduction

With the exception of the hazard posed by annosus root disease, the overall tree hazard level in the campground is fairly low. However, it appeared that to date most hazard tree removals in the



campground have been merely in response to tree mortality. To assist with future tree hazard evaluations, I gave Carl a copy of an evaluation sheet that may be used to better assess and document tree hazard potential. Copies have also been sent to Rich Svilich, Roger Siemers and Deb Fleming. The sheet lines out various kinds of target potentials and tree defects, and combines the two to come up with an overall hazard rating. The rating sheet helps to standardize one's approach and is very helpful in deciding if a tree needs to be removed. In addition, the resulting written documentation could be used to support the Forest Service in the event of a tree failure-related court action.

Annosus Root Disease Management

The presence of annosus root disease in the campground raises serious concerns with regard to both visitor safety and management of the forest stand. During our brief visit to the campground, it was impossible to check all true fir stumps for fruiting bodies or decay patterns indicative of the disease. However, because it is likely that the disease is more widespread, a survey should be done to pinpoint the locations of disease centers. During our visit, Dave and I showed Carl what to look for, and he indicated that he should be able to run a survey. Time permitting, I could assist with this effort as well.

In many areas of the United States, treatment of recreation areas that are infested with annosus root disease consists of removing all true firs within 30-50 feet of root diseased stumps. However, in northern California, investigations suggest that while the disease is widespread in true fir, failures are fairly uncommon in vigorously growing trees. Thus, in the infested areas of Kangaroo Lake Campground (within 30-50 feet of stumps that appear to be infected), thinning to remove declining firs should reduce hazard potential to acceptable levels. Suppressed firs and those with poor form (thinning crown, holes in the crown, flat tops or poor crown ratio) should be removed first. Once this is done, the outer inch of the remaining firs should be cored with an increment borer to determine the degree of growth suppression that has occurred within the last 10-20 years. Any firs that have greatly reduced growth and appear to have little chance of releasing should also be removed. This treatment may be done in conjunction with the general thinning effort suggested below. Where stocking levels drop below acceptable levels, planting of pines and incense-cedar may also be done.

Hazard tree reduction in areas with root disease is an inexact science. While the hazard potential following the suggested thin will be greatly reduced, the treatment will not reduce the hazard level as much as the removal of all firs within 30-50 feet would. However, the aesthetic impacts of the latter treatment are much greater than that of the former. In the end, it is up to the District and Forest as to how much risk they wish to accept.

Because annosus root disease can spread aerially by spores, great care will need to be taken to avoid the wounding of residual live trees. Freshly created stumps of live and recently dead firs are also very susceptible to infection. Regional direction requires that all conifer stumps in developed recreation areas be treated to prevent infection (FSM 2323.14 R-5 Supp. 164). This policy should be followed in association with any conifer removals at Kangaroo Lake Campground, regardless of whether they are for hazard tree reduction, annosus root disease management or general vegetation management. Treatment involves application of a borate fungicide to the stump surface after the tree is felled. It is advisable to make this application immediately after felling. Sporex is the material that is currently registered for this use.

Vegetation Management

The number of trees that have been removed over the past 5-10 years, and the reduction in the size of the growth rings of standing and cut trees indicates that the stand is in a declining state. Without immediate action, additional trees will continue to be lost. Thinning in the clumps of trees, leaving 2-3 trees where 6-8 now stand, will prolong the life of the remaining trees and provide an opportunity to choose which ones will remain over the long haul. When choosing trees for removal, hazardous trees and those with the poorest form (thinning crown, multiple tops, large wounds, exposed roots, flat tops, etc.) should be taken first. Trees that are infected with dwarf mistletoe may likewise be preferentially removed (particularly those with large bole cankers), but may be retained if no other desirable trees are nearby. Because of the presence of annosus root disease in the campground, wherever well-formed pines are present, the white and red firs should be discriminated against.

In the few areas where stocking levels are low, planting may be done to augment these levels. Pines (particularly Jeffrey pine) and incense-cedar are desirable species for planting.

To better coordinate the above activities, a comprehensive vegetation management plan should be drafted for the campground. The plan should include a statement of the goals and objectives for managing the vegetation, a description of current conditions and the specific measures that will be adopted to maintain and enhance the vegetation, as well as a timeline for their implementation. Provisions for the development of interpretive opportunities may also be included. To assist with this effort, I sent Carl Varak and Rich Svilich copies of various campground vegetation management plans that I was involved with while I was stationed in Colorado. I also sent copies to Roger Siemers and Deb Fleming, to assist with the development of Vegetation Management plans in campgrounds on the Goosenest Ranger District.

Trail Creek Campground

Trail Creek Campground contains approximately 15 campsites, and is at an elevation of approximately 4700 feet. Overstory vegetation consists of ponderosa pine, Douglas-fir, white fir, sugar pine, and some incense-cedar. Although all species are represented in the understory, most of it is white fir. Overall, both the overstory and understory are overstocked, and would benefit from thinning to a spacing of at least 10-20 feet. Suppressed trees were common in the understory, while overmature, declining trees were observed in the overstory. White fir dwarf mistletoe (*Arceuthobium abietinum* f. sp. *concoloris*) was found scattered in the white fir, while lesser amounts of Douglas-fir dwarf mistletoe (*Arceuthobium douglassii*) were found in some of the Douglas-fir. In the white fir, Cytospora canker (caused by *Cytospora abietis*) was also found in association with the dwarf mistletoe branch infections. Fruiting bodies of *H. annosum* were found in three white fir stumps; at the far end of the overflow area, and at at campsites 9 and 11. While a number of windthrown trees were noted throughout the campground, only a few had decayed roots. It is, however, very likely that annosus root disease is scattered further in the white fir in the campground. Evidence of Armillaria root disease (rhizomorphs and possibly some mycelial fans) was also found in one of the annosus-infected stumps, and in a white fir stump across from campsite #1.

Recommendations:

Hazard Tree Reduction

As at Kangaroo Lake Campground, with the exception of the annosus root disease situation, the overall hazard tree level is fairly low. Mitigation of tree hazard can be done in conjunction with the thinnings and treatments recommended below. Again, the stumps of all conifers that are removed (for whatever reason) will need to be treated with Sporax to limit colonization by *H. annosum*.

Annosus Root Disease Management

Again, the presence of annosus root disease in the campground raises serious concerns with regard to both visitor safety and management of the forest stand. Since the Armillaria root disease that was found was likely a secondary colonizer of stumps that are infected with *H. annosum*, addressing the annosus situation should take care of the Armillaria as well. As at Kangaroo Lake, I recommend additional survey to identify the location of annosus root disease, then removal of suppressed and poorly-formed firs within 30-50 feet of infected stumps.

Dwarf Mistletoe/Cytospora Canker Management

Although dwarf mistletoe and Cytospora canker seldom contribute to tree hazard (except in the case of very heavy infestations), many white firs that are infected with dwarf mistletoe would likely be removed as part of the mitigation effort for annosus root disease. Because large bole cankers on white fir that are caused by dwarf mistletoe are prone to becoming infected with decay fungi, cankered firs that are within striking range of a target should also be removed. Any remaining white firs or Douglas-firs that are infected with dwarf mistletoe may be preferentially removed (or in some cases, retained) as part of the overall thinning of the stand.

Vegetation Manage

As stated above, the forest stand at Trail Creek Campground would benefit from an overall thinning to a spacing of about 10-20 feet. These removals should be integrated with treatments for root disease, dwarf mistletoe and tree hazard. Planting of pines, Douglas-fir (at least 35 feet away from any trees with Douglas-fir dwarf mistletoe) and incense-cedar may be considered where necessary natural regeneration is sparse and tree removals have reduced stocking to unacceptable levels. Development of a vegetation management plan is again recommended to help coordinate these efforts.

Carter Meadows

Carter Meadows was last visited by Forest Pest Management personnel on July 8, 1993. At the time, the Carter Meadows Horse Camp was in operation, but the nearby Hidden Horse Campground had not yet been built. Dwarf mistletoe in the red and white fir, cytospora canker, annosus root disease, and *Scolytus* and true fir roundheaded beetles were identified as the most important diseases and insects affecting the forest stands in the two areas. Although no specific recommendations were made, FPM Report N93-10 (dated Dec. 17, 1993) discussed the potential effects of several management options, including No Action, Hazard Tree Reduction, Annosus Root Disease Management, and Vegetation Management.

The overstory at Carter Meadows Horse Camp consists almost entirely of white fir, though a few scattered incense-cedar are also present. Much of the overstory is dense and overmature and declining, and much of the understory is suppressed. Our inspection revealed many of the same

insects and diseases that were reported in 1993. Dwarf mistletoe is present in scattered red and white firs, along with *Cytospora* canker in the white fir. Many of the firs had dead tops, holes in the crown, wounds and butt decay. During our brief visit, confirmation of annosus root disease (by finding a fruiting body) was made in only one stump, but many stumps throughout the campground have central cavities and laminant decay that appear to be caused by *H. annosum*. It appears that the disease is present throughout the campground.

The vegetation at the newer Hidden Horse Campground is more diverse, consisting of red fir, white fir and lesser numbers of lodgepole pine, ponderosa pine, incense-cedar and mountain hemlock. Stocking is not as dense as at the Horse Camp, and the condition of the white fir appears to be better. Again, scattered dwarf mistletoe and *Cytospora* infections were found in the firs, and many trees with dead tops, flat tops (overmature and declining) and poor form (multiple tops, wounds, etc) were noted. However, annosus root disease was not found in the area.

Recommendations:

Hazard Tree Management

Recommendations with regard to hazard trees are the same as those for Trail Creek Campground. Right now, the only immediate needs for hazard tree removal at Hidden Horse Campground are two dead firs behind campsite #5. However, removal of trees with minor hazard potential (dead tops, poor form and dwarf mistletoe infections) may be done in conjunction with the light thin recommended below. In contrast, most hazard tree considerations at the Horse Camp would be corrected in the treatment for annosus root disease. New stumps at both Horse Camp and Hidden Horse Campground will need to be treated with Sporax.

Annosus Root Disease Management

Because there is at present no discernable annosus root disease at the newer Hidden Horse Campground, no actions need to be taken other than to treat with Sporax any stumps that are created for thinning, hazard tree or dwarf mistletoe tree removal. In contrast, at the Horse Camp, annosus root disease is a significant problem which poses a serious hazard to any visitors who are camped there. Although it remains to be seen exactly where the disease is located, initial indications are that it is likely present throughout most of the campground. Thinning of all suppressed and poorly formed white fir, red fir and mountain hemlock within 30-50 feet of visibly infected stumps is again recommended. This will likely result in this treatment being done throughout the campground. Planting of pines and incense-cedar may be necessary in some areas.

Vegetation Management

As at Kangaroo Lake and Trail Creek, thinning would help to maintain the health of selected overstory trees while releasing some of the currently suppressed trees in the understory. Only a light thin is required at Hidden Horse Campground, removing the worst of the worst trees (hazard trees, ones that are heavily infected with dwarf mistletoe and/or *Cytospora* canker, and poor form trees). Because of the potential for introduction of annosus root disease, pines and incense-cedar should be retained over fir and hemlock. At the Horse Camp, if the root disease does not turn out to be as widespread as it appears, then a similar, though heavier thinning would be needed to prolong the life of the stand. Development of a vegetation management plan is

again recommended.

Juanita Lake Campground

Juanita Lake Campground is the most heavily used campground on the Gooseneck Ranger District. Located at an elevation of 5100 feet, the campground has about 24 campsites and a group camp. Although ponderosa pine and white fir are the two most common tree species in the campground, significant numbers of Douglas-fir, incense-cedar, juniper and sugar pine are also present. Tree distribution is clumpy, particularly in the ponderosa pine. Trees of many ages are present, but inspection of stumps and coring of a couple of trees revealed that growth in the stand has slowed considerably over the last 20 years.

The most significant pest condition that was found in the campground was the presence of mountain pine beetle in many of the ponderosa pines, as indicated by pitch tubes and the characteristic gallery pattern. Western dwarf mistletoe (*Arceuthobium campylopodum*), Douglas-fir dwarf mistletoe (*A. douglasii*) and incense-cedar mistletoe (*Phoradendron juniperinum* ssp. *libocedri*) were also noted in ponderosa pine, Douglas-fir and incense-cedar, respectively. Mistletoe levels were generally low, and it was unusual for an infected tree to have a DMR rating greater than 3. The only other problems that were noted were the presence of dead tops in a number of the white firs (particularly at campsite #11) and the presence of a large incense-cedar snag within falling distance of the group site parking lot. With the exception of this snag, hazard tree levels were low. Annosus root disease was not found in the campground.

Recommendations:

Vegetation Management

As at the other three campgrounds, thinning is recommended to reduce competition and prolong the life of the most desirable trees. Because bark beetles are already starting to infest the pines, immediate thinning of the clumps of pines is needed. Again, the thinning operation should concentrate on removal of trees that are infected with bark beetles and dwarf mistletoe, as well as declining, poorly formed and hazardous trees. While the bark beetles have already chosen many of the pines that will need to be removed, the sooner the thinning is started, the more uninfested trees will remain from which to choose from for retention. Trees that are lightly infected with dwarf mistletoe, but are otherwise desirable, may be pruned to remove infected branches. Because incense-cedar mistletoe generally causes little damage to its host, trees with this disease need not be discriminated against. Again, a vegetation management plan should be drafted in order to better coordinate the recommended activities.

Annosus Root Disease Management

Although annosus root disease is not present in the campground, because the disease is present in the vicinity, all coniferous stumps that are created during management operations will need to be treated with Sporax. Monitoring should also be undertaken to identify any future introductions of the disease in the campground.

Dwarf Mistletoe/Hazard Tree Management

As indicated above, the levels of dwarf mistletoe infestation and hazard trees are low enough that

they may be best addressed as part of an overall thinning effort.

Conclusions

Each of the four campgrounds need general vegetation management and additional treatments to address specific insect and disease situations. While the need for vegetation management at all four campgrounds is high, because of the high hazard due to annosus root disease, the need for immediate action is highest at Kangaroo Lake, Carter Meadows Horse Camp and Trail Creek Campground. The successful implementation of vegetation management at these campgrounds will require a long-term commitment on the part of the Scott River and Gooseneck Ranger Districts, as well as the Klamath National Forest. Preparation of vegetation management plans would help in the coordination of these efforts. Both timber and recreation staffs should be involved in the development of the plans. I am also available to provide technical assistance.

In order to give the public a greater understanding of the vegetation management activities in the campgrounds, opportunities for interpretation should be explored and exploited. Placement of signs in the campgrounds, as well as the development of nature trails provide excellent opportunities for the Forest Service to generate public awareness of what is being done to enhance the health of the surrounding forest.

While in the field, I mentioned to Carl, Rich, Roger and Deb that they may want to consider applying for Forest Pest Management Prevention/Suppression funds to help pay for the recommended treatments. FPM Suppression projects in developed recreation areas generally receive fairly high priority for funding. Funds may be used for the preparation of vegetation management plans, project implementation, and I&D-related interpretive efforts. Tree planting and the routine removal of hazard trees (that are not part of a larger I&D mitigation effort) cannot be funded by this program. Although the implementation of FFIS may affect this, multi-financed projects, combining timber, recreation and FHM suppression dollars have historically received the best chance for funding. *This year, FPM Prevention/Suppression proposals will be due to Dave Schultz and me by November 1, 1999.* In order to be considered, all proposal packages must be received on time and be complete, including an FS-3400-2 project proposal form, a one page summary of the project with a brief narrative of objectives and benefits, an economic analysis of the project, in production function format, and a WO one page summary sheet (this part will be completed by Dave or me). As always, I am available to provide further information and assistance in applying for these funds.

If you have any questions or comments regarding the observations or recommendations in this report, feel free to contact me here in Redding.

/s/ Pete Angwin
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